



EERA-DTOC: Design tools for offshore clusters

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Publication date:
2012

Document Version
Publisher's PDF, also known as Version of record

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Citation (APA):
Giebel, G., Madsen, P. H., Hasager, C. B., Lange, B., Cabezon, D., Schepers, G., & Iuga, D. (2012). *EERA-DTOC: Design tools for offshore clusters*. Poster session presented at EWEC 2012 - European Wind Energy Conference & Exhibition, Copenhagen, Denmark.

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Abstract

The European Energy Research Alliance (EERA) in collaboration with valuable industry partners addresses the call proposing an integrated and validated design tool combining the state-of-the-art wake, yield and electrical models available in the consortium, as a plug-in architecture with possibility for third party models to extend and enhance predictions.

The concept of the EERA-DTOC project is to combine this expertise in a common integrated software tool for the optimized design of offshore wind farms and wind farm clusters acting as wind power plants. Since there is a small amount of data about the behavior of wind farm wake, especially far-field wake, a small campaign has been organized to collect lidar data and high-resolution satellite images in order to decrease uncertainties around wind farm wake predictions. The new data are expected to enable better tuning, and eventually better modeling of the far-field of wind farm wakes.

Product Vision

A robust, efficient, easy to use and flexible **tool** created to facilitate the **optimised design** of individual and clusters of **offshore wind farms**.

A keystone of this optimisation is the **precise prediction** of the future long term wind farm **energy yield** and its associated **uncertainty**.

Robust, in the context of EERA-DTOC is understood to mean validated, stable, reliable, reproducible and technically convincing (e.g. would stand up to the scrutiny of an independent engineer during technical due diligence for project finance).

EERA-DTOC is to be built by integrating **existing** models (wake, grid, production etc.).

The design in question is that of the wind turbine **layout** (and/or wind farm clusters) and their associated electrical infrastructure. Design optimisation is with regard to the **total cost of energy** (including cost of finance). The EERA-DTOC tool will facilitate the optimisation process by supporting decision making through the efficient processing of many **design scenarios** for consideration in conjunction with separate cost/financial modelling tools.

At the individual wind farm level the anticipated users are primarily **developers** looking to optimise their specific wind farms subject to the influence of neighbouring wind farms.

At the cluster level the anticipated users are **strategic planners** looking to optimise the location of many offshore wind farms (and their associated electrical infrastructure) within a particular region.

In particular EERA-DTOC will focus on precisely predicting the **wake losses**, and associated uncertainty, due to both a specific offshore wind farm on itself (internal wake losses) and wake losses due to clusters of neighbouring offshore wind farms (external wake losses).



Work Packages

The EERA-DTOC (Design Tools for Offshore Wind Farm Cluster) project is formed in seven work-packages (WP):

WP1 - Wake modelling: The objective is to improve model design of wind turbines according to an enhanced understanding of wind turbine wakes.

WP2 - Interconnection optimization and power plant systems: The main focus of this WP is to develop a design tool and procedure for the optimisation of the electrical design of offshore wind farm clusters including the provision of power plant system services by the cluster.

WP3 - Energy yield prediction of wind farm clusters: The objective is to deliver accurate value of the expected net energy yield from clusters of wind farms and also the uncertainty of the expected value by integrating the results from WP1 and WP2.

WP4 - Integration and development of software: The WP4 includes integrating existing design tools for offshore wind farms so as to develop the integral offshore cluster design tool.



WP5 - Experiments. Validate, demonstrate design tool: The focus here will be on validating the integrated offshore wind farm design tool and on demonstrating that the integrated offshore wind farm design tool is important to the industry. A highlight are the wake measurements foreseen at the BARD 1 offshore wind power plant.



WP6 - Dissemination and exploitation activities: This WP aims at promoting the project visibility by creating an own identity, which means that the project is targeted at dissemination of the EERA-DTOC project results and its design tool for wind farm clusters interconnectors among different stakeholders, such as project developers and planners, transmission system operators, consultants and research institutes.



WP7 - Management: DTU Wind Energy (former Risø DTU) is responsible for management and administration of the project in accordance with the contract.

Partners



Announcement



Please join the EERA-DTOC side event on Tuesday, 1600-1730 in Room 20.

www.EERA-DTOC.eu